

CALCIUM (ATOMIC ABSORPTION, DIRECT ASPIRATION)

1.0 SCOPE AND APPLICATION

1.1 See Section 1.0 of Method 7000.

2.0 SUMMARY OF METHOD

2.1 See Section 2.0 of Method 7000.

3.0 INTERFERENCES

3.1 See Section 3.0 of Method 7000.

3.2 All elements forming stable oxyanions (P, B, Si, Cr, S, V, Ti, Al, etc.) will complex calcium and interfere unless lanthanum is added. Addition of lanthanum to prepared samples rarely presents a problem because virtually all environmental samples contain sufficient calcium to require dilution to be in the linear range of the method.

3.3 PO_4 , SO_4 , and Al are interferents. High concentrations of Mg, Na, and K interfere.

4.0 APPARATUS AND MATERIALS

4.1 For basic apparatus, see Section 4.0 of Method 7000.

4.2 Instrument parameters (general):

4.2.1 Calcium hollow cathode lamp.

4.2.2 Wavelength: 422.7 nm.

4.2.3 Fuel: Acetylene.

4.2.4 Oxidant: Nitrous oxide.

4.2.5 Type of flame: Stoichiometric.

4.2.6 Background correction: Not required.

5.0 REAGENTS

5.1 See Section 5.0 of Method 7000.

5.2 Preparation of standards:

5.2.1 **Stock solution:** Suspend 2.500 g of CaCO_3 (analytical reagent grade, dried for 1 hr at 180°C) in Type II water and dissolve by adding a minimum of dilute HCl. Dilute to 1 liter with Type II water. Alternatively, procure a certified standard from a supplier and verify by comparison with a second standard.

5.2.2 Prepare dilutions of the stock solution to be used as calibration standards at the time of analysis. The calibration standards should be prepared using the same type of acid and at the same concentration as will result in the sample to be analyzed after processing, including 1 mL of lanthanum chloride per 10 mL sample or standard (see Paragraph 5.2.3).

5.2.3 **Lanthanum chloride solution:** Dissolve 29 g La_2O_3 in 250 mL concentrated HCl -

CAUTION: REACTION IS VIOLENT -
and dilute to 500 mL with Type II water.

6.0 SAMPLE COLLECTION, PRESERVATION, AND HANDLING

6.1 See Chapter Three, Section 3.1.3, Sample Handling and Preservation.

7.0 PROCEDURE

7.1 Sample preparation: The procedures for preparation of the sample are given in Chapter Three, Section 3.2.

7.2 See Method 7000, Paragraph 7.2, Direct Aspiration.

8.0 QUALITY CONTROL

8.1 See Section 8.0 of Method 7000.

9.0 METHOD PERFORMANCE

9.1 Precision and accuracy data are available in Method 215.1 of Methods for Chemical Analysis of Water and Wastes.

9.2 The performance characteristics for an aqueous sample free of interferences are:

Optimum concentration range: 0.2-7 mg/L with a wavelength of 422.7 nm.
Sensitivity: 0.08 mg/L.
Detection limit: 0.01 mg/L.

10.0 REFERENCES

1. Methods for Chemical Analysis of Water and Wastes, EPA-600/4-82-055,
December 1982, Method 215.1.

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